Unit 11

Southeast/Caribbean Invertebrate Fisheries

Introduction

Important recreational and commercial marine invertebrates in the southeastern United States include shrimp, spiny lobster, stone crab, and conch. Some fisheries, as for coral, are almost nonexistent. Others, like the penaeid shrimp fishery, are both extensive and extremely valuable. The southeast region's shrimp fisheries are one of the most valuable U.S. fisheries based on ex-vessel revenue. Some fisheries, such as those for spiny lobster and stone crab, have only moderate value on a national basis but are important regionally. Because of the diversity in species, fisheries, geographic locations, yields, values, etc., each species group in the marine invertebrates must be examined separately for proper perspective.

Penaeid shrimp have been fished commercially since the late-1800s. The first fishery used long seines in shallow waters, until the otter trawl, introduced in 1915, extended shrimping to deeper waters. At first, most vessels towed one large trawl, sometimes 120 feet wide at the mouth. Soon, a two-trawl arrangement (each about 40-75 feet wide at the mouth) was found more effective. Some shrimpers are using a twin-trawl system which tows four trawls of about 40 feet wide at the mouth. The twin-trawl system is now very common gear on commercial offshore shrimpers.

Regulations in the Gulf of Mexico shrimp FMP restrict shrimping by closing two shrimping grounds. There is a seasonal closure of fishing grounds off Texas for brown shrimp and a closure off Florida for pink shrimp. There are also size limits on white shrimp caught in Federal waters and landed in Louisiana. These regulations strive to improve the monetary value of the shrimp fishery.

In the South Atlantic, white shrimp stocks are centered off the Georgia and South Carolina coasts. Brown shrimp are centered off the North and South Carolina coasts. The Atlantic fishery is much smaller than in the Gulf and currently is managed under a Federal FMP implemented in November 1993. This FMP provides for compatible state and Federal closures if needed to protect overwintering shrimp stocks.

Spiny lobsters are managed under a joint FMP, coordinated with regulations by the State of Florida. Current regulations specify a 3-inch minimum carapace length, a closed season from 1 April to 5 August, protection of egg-bearing females, closure of some nursery areas, recreational bag limits, and a controversial two-day "sport" season.

Caribbean spiny lobsters are caught primarily by fish traps, lobster traps, and divers. The Caribbean FMC's spiny lobster FMP includes the Federal waters of Puerto Rico and the U.S. Virgin Islands. The Federal plan is based on a 3.5-inch minimum carapace length and protection of young egg-bearing lobsters.

Table 11-1. Southeast and Caribbean Invertebrates

Productivity in metric tons and status of fisheries resources

Species	Recent Average Yield (RAY)[1]	Current Potential Yield (CPY)	Long-Term Potential Yield (LTPY)	Fishery Utilization Level	Stock Level Relative to LTPY
Brown shrimp					
Gulf of Mexico[2]	54,795	Unknown	63,054	Full	Near
Atlantic	3,047	Unknown	3,696	Full	Near
White shrimp					
Gulf of Mexico[2]	30,938	Unknown	34,794	Full	Near
Atlantic	6,168	Unknown	5,173	Full	Near
Pink shrimp					
Gulf of Mexico[2]	5,427	Unknown	7,262	Full	Below
Atlantic	733	Unknown	948	Full	Near
Royal red shrimp	234	Unknown	Unknown	Unknown	Unknown
Seabob shrimp	4,442	Unknown	Unknown	Unknown	Unknown
Rock shrimp	2,146	Unknown	Unknown	Unknown	Unknown
Spiny lobster					
Southeast U.S.[3]	3,099	2,400	3,565	Over	Below
Caribbean	135	Unknown	Unknown	Unknown	Unknown
Stone crab[4]	1,264	1,121	976	Full	Near
Queen conchs[5]	55	55	Unknown	Over	Below
Coral[6]	0	0	Unknown	Unknown	Unknown
Total	112,483	111,641	95,165		

[1] 1991-93 average.
[2] Long-term potential of brown, white, and pink shrimp based upon last observed ten year average annual yield (1984-93).
[3] Yields based upon commercial catches; recreational catch is unknown but may be significant.
[4] Yields are in tons of claws; declawed crabs regnerate new claws.
[5] Landings from Puerto Rico. Fishing prohibited in Florida and U.S Virgin Islands.
[6] Coral harvests prohibited except for a small take allowed for use in aquarium and pharmaceutical industries.

The conch fishery targets the queen conch but also takes other species. Most conch are taken by divers, and the resource can be easily depleted. Conch are currently protected in state and Federal waters off Florida and in the territorial waters of the U.S. Virgin Islands. An FMP is being developed for the Federal waters off Puerto Rico and the U.S. Virgin Islands by the Caribbean FMC.

Corals are managed as two groups, hard and soft. Because they are generally slow growing and provide critical habitat for many fishes, hard corals are protected except for very small collections taken by permit for research and educational purposes. Regulations are based on the fact that the value of coral as habitat is far more important than their commercial use.

Soft corals include gorgonians and sea fans. Some gorgonians are taken (about 50,000 colonies per year) for the aquarium and pharmaceutical industries. Growth potential for most species is considered limited. Sea fans are completely protected except for research and educational use by permit.

Stone crabs are caught mainly off southern Florida, though some are landed farther north along Florida's west coast. The Gulf of Mexico stone crab FMP, approved in September 1979, generally extended Florida's regulations into the EEZ. These regulations are based on a minimum claw size of 2.75 inches, biodegradable trap panels, protection of egg-bearing females, and closed seasons. Minimum size regulations assure that crabs have reproduced at least once before being caught.

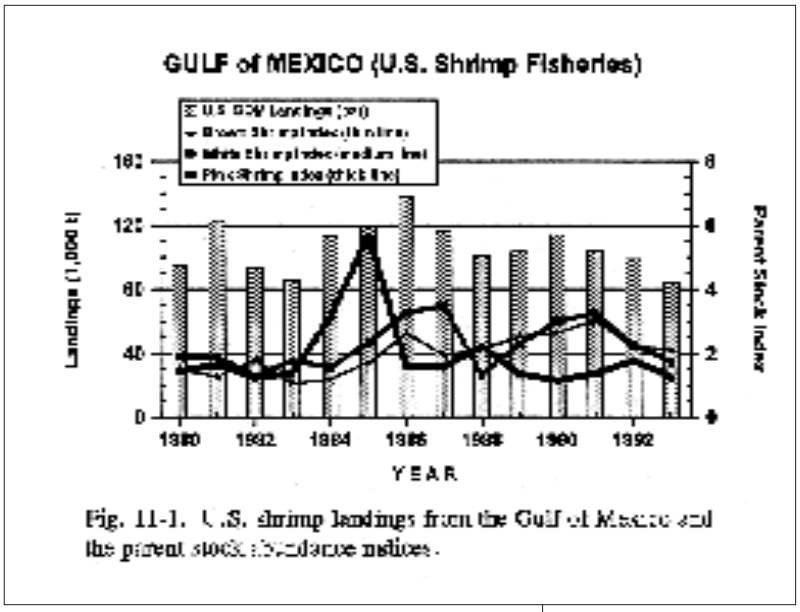

Fig. 11-1. U.S. shrimp landings from the Gulf of Mexico and the parent stock abundance indices.

Species and Status

Shrimp Species

Brown, white, and pink shrimps account for 91% of the total Gulf of Mexico shrimp catch. In 1993 alone, these three important species produced 83,919 t valued at over $328 million in ex-vessel revenue (Fig. 11-1). They are found in all U.S. Gulf waters inside 120 m. Most of the offshore brown shrimp catch is taken at 20-40 m depths, white shrimp are caught in 10 m or less, and pink shrimp in 20-30 m. Brown shrimp are most abundant off the Texas-Louisiana coast, and the greatest concentration of pink shrimp is off southwestern Florida. In the South Atlantic, white and pink shrimp landings are about 15% of their Gulf counterparts, while brown shrimp are less than 5% of the Gulf yield. Current, recent, and long-term potential yields for these species are given in Table 11-1.

Gulf of Mexico Shrimp Landings (t)

1992	98,700
1993	84,000

Gulf brown and white shrimp catches increased significantly from the late-1950s to around 1990, with the last 3 years showing a slight decrease from these maximum values. Pink shrimp catches were stable until about 1985; then they declined and were at an all time low in 1990. In recent years the catches have started to increase and are again near average levels. The numbers of young shrimp for each species entering the fisheries have generally reflected the level of catch. All commercial shrimps are harvested at maximum levels. The fishery is believed to have more boats and gear than needed (i.e. reducing fishing effort would not significantly reduce the shrimp catch). Reducing the bycatch of the shrimp industry, however, would help protect finfish resources.

The number of young brown shrimp produced per parent has increased significantly, but not in white and pink shrimp. The brown shrimp increase appears related to marsh alterations. Coastal sinking and a sea-level rise in the northwestern Gulf inundates intertidal marshes longer, allowing the shrimp to feed for longer periods within the marsh area. In the Gulf, both factors have also expanded estuarine areas, created more marsh edges, and provided more protection from predators. As a result, the nursery function of those marshes has been greatly magnified and brown shrimp production

has expanded. However, continued subsidence will lead to marsh deterioration and an ultimate loss of supporting wetlands, and current high fishery yields may not be indefinitely sustainable. Parent stock indices for the three major Gulf species are shown in Fig. 11-1.

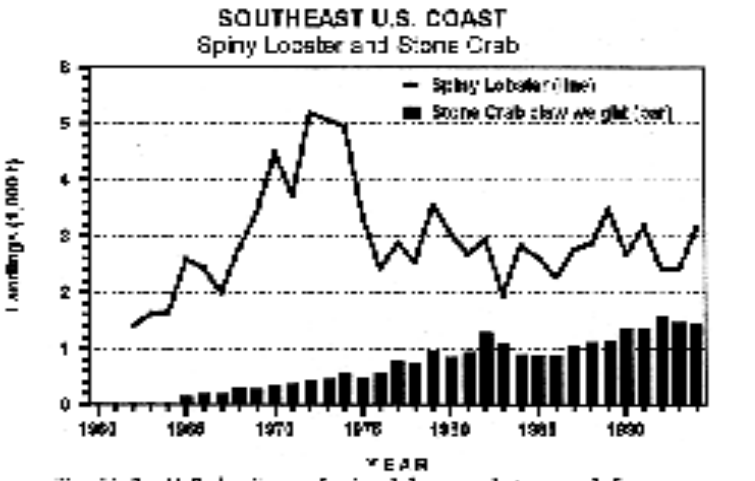

Fig. 11-2 U.S. landings of spiny lobster and stone crab from southeastern U.S. coastal waters.

SE U.S. Coast Spring Lobster Landings (t)

1993	2,400
1994	3,100

SE U.S. Coast Stone Crab Landings (t)

1993	1,500
1994	1,400

Spiny Lobster

Annual Florida spiny lobster landings were fairly stable during the 1980s, running about 2,700 t from the Gulf of Mexico (Fig. 11-2), but yielding recent high landings in 1989 of 3,200 t, with ex-vessel revenue of about $20 million. On Florida's Atlantic coast, landings have averaged 230 t, valued at $2 million. The fishery is considered "overcapitalized" with approximately 900,000 lobster traps fished during 1992. In 1993, a trap reduction program was established, not to exceed 10% per year, which would maintain or maximize sustainable spiny lobster harvest from the fishery. Excessive effort in the fishery has been estimated to occur when the number of traps fished exceeds 300,000 per year. Spiny lobster fishers utilize live undersized lobsters as attractants in their traps, but due to a high mortality rate for these "live bait" animals, about 30-50% of the potential yield is lost. The recreational fishery in Florida had over 120,000 participants purchasing recreational lobster stamps during the 1991 season. Recreational spiny lobster were estimated to comprise 41% of total landings during the first month, and 22% of the total 1991-92 season's landings.

Annual spiny lobster landings for Puerto Rico have averaged 144 t over the past 23 years, varying from 108 t in 1972 to a high of 233 t in 1979, then declining to a low of 65 t in 1988. No precise data are available on fishing effort, but the Puerto Rican stock produced landings of 72 t in 1992 and now appears to be overutilized. U.S. Virgin Islands landings for 1980-1988 were fairly stable, averaging 19 t.

Spiny lobster larvae may drift at sea for 9 months, and thus identification of their source or parent stock is almost impossible. There is a practical management need to know far more about their origin and subsequent movement into the fishery.

Stone Crab

Annual catches of stone crab (claw weight) varied from 1,200 to 1,400 t on the Gulf of Mexico and Atlantic coasts through the 1980s with a record 1,565 t landed during 1992 (Fig. 11-2). Recent annual ex-vessel revenue averaged $12-15 million. The number of stone crab traps fished seasonally increased from 295,000 in 1979-80 to 567,00 in 1984-85 to a record 745,000 during 1992-93. While total landings have increased modestly in recent years, it is clear that these landings are the result of increased effort (number of traps fished), especially during the early months of the stone crab season.

Issues

Habitat Concerns

Estuarine and marsh loss remove critical habitat for young shrimp. Additional studies are needed to further assess the impacts of human-induced changes in habitat availability, environmental conditions, predator abundance, and pollution in the nursery areas. Florida spiny lobsters depend on reef habitat and shallow-water algal flats for feeding and reproduction. These habitat requirements may conflict with expanding coastal developments. The productivity of stone crabs in Florida Bay is related to water quality and flow through the Everglades. Specific water requirements need to be identified and maintained through comprehensive Ever-

glades water management. A unified program to integrate and study the effects of environmental alterations, fishing technology, regulations, and economic factors on shrimp, lobster, and crab production and restoration is needed, particularly in the reef habitats of south Florida. Steps need to be taken to mitigate or restore lost estuarine habitats.

Transboundary Stocks and Jurisdiction

Spiny lobster stocks in Florida could be of Caribbean origin and swept into the region by currents of the Gulf Stream. Another hypothesis is that they could comprise a number of different spawning stocks. The actual sources of all Florida and Caribbean lobster stocks (both U.S. and foreign) need to be identified and international management established to prevent overharvesting.

Management Concerns

Many small spiny lobsters are caught in the Puerto Rican fishery. If these lobsters were allowed to grow to a larger size before harvest, there would be a substantial increase in yield by weight. Modification of the traps to allow more of the small lobsters to escape needs to be investigated. Small lobsters are sometimes used to bait traps in the lobster fishery. This current practice is wasteful and hinders rebuilding of the stock.

The shrimp fisheries are currently overcapitalized, with more fishing effort being expended than needed to harvest the resource. In addition, the harvesting of small shrimp inshore is sacrificing yield and value of the catch by cutting short future growth.

Bycatch and Multispecies Interactions

Shrimp fisheries use small-mesh nets and can catch nontarget species such as red snappers, croakers, seatrouts, and sea turtles. For finfish, this harvest is often of juveniles and may be a major source of mortality on these young fish. Some fish caught by shrimpers are currently at low stock levels (Unit 9). This bycatch may slow or prevent recovery if not mitigated.

As sea turtles are all listed as endangered or threatened under the ESA, shrimp vessels have been required to use turtle excluder devices in their nets during certain times of the year since 1988 to avoid capturing sea turtles and thus protect the stocks.

Progress

NOAA Fisheries and the fishing industry are working together to prepare a research plan to address the problems of finfish bycatch by shrimp fisheries in the Gulf of Mexico and South Atlantic.

A gear conflict between stone crab trappers and shrimp trawlers off southwestern Florida has been mostly resolved in the EEZ with a line separating the fishing areas and seasonal area closures. This approach requires continued monitoring to gauge its success and prevent renewal of conflicts. ❑